

## Response

### **A. Introduction**

Claims 1-2 and 5-12 remain pending in the application. In the Office Action, *the Examiner withdrew all prior rejections of these claims, including one based on International Patent Publication No. WO 99/44042 of Singh, et al. (the “Singh Publication”)*. Rather than allow the claims, however, she issued what she called a “new” rejection based on U.S. Patent No. 6,483,959 to Singh, et al. (the “Singh Patent”). See Office Action at pp. 2-4. Because *the Singh Patent is the U.S. version of the Singh Publication*, its disclosure adds *nothing* relevant to that of the Singh Publication and thus likewise fails to disclose or suggest the claimed invention. For at least this reason, Applicants continue to believe no *prima facie* basis exists for rejecting any of claims 1-2 and 5-12.

### **B. The Rejection**

Applicants reiterate their comments contained in prior submissions. In particular, the particle-detecting waveguide structure of independent claim 1 comprises:

- a second layer having refractive index of 1.33-1.45;
- a third layer having a higher refractive index than that of the second layer; and
- a sensing layer of a medium disposed on the second layer, the medium adapted to trap a target particle of diameter 1-10  $\mu\text{m}$ ;

with the structure being capable of supporting a bulk optical mode in the second layer. As further indicated in claim 1, when light is incident the upper surface of the

third layer, the optical mode generated in the second layer penetrates into the sensing layer so as to overlap at least a major portion of the particle.

*1. No Bulk Optical Mode is Supported in the Second Layer of the Waveguides of the Singh Patent.*

Clear is that the Singh Patent is **not** directed to a structure capable of supporting a bulk optical mode in the second layer as claimed. Instead, the Singh Patent **repeatedly** identifies the bulk optical mode as being supported in the **sensing** layer. Among the many instances of this identification are these:

- “The structure defines a waveguide capable of supporting an optical mode **confined in a sensing layer**.” See Singh Patent, Abstract, ll. 4-5; id., col. 4, ll. 50-51.
- “The [optical] mode is **centred on the dextran gel [sensing] layer 4**.” See id., col. 11, ll. 39-40; see also id., col. 11, l. 19 (“sensing layer of dextran gel 4”).
- “[A] bulk mode which is centred on the **sensing** layer . . . .” See id., col. 2, ll. 20-21.
- “The waveguide configuration . . . provides strong confinement of light in the **sensing** layer 21.” See id., col. 19, ll. 37-39.
- Presented in FIG. 25 of the Singh Patent is a strong peak of optical mode amplitude in **sensing** layer 31.

The Examiner appears to concede this fact, referring to the Abstract of the Singh Patent and expressly (and correctly) identifying a sensing layer as element 31. See Office Action at p. 2. However, she then inexplicably cites the Abstract as somehow supporting the proposition that the bulk optical mode is supported in elements 32 and 33 of the Singh Patent which, as noted above, is undeniably incorrect. For at least this reason, therefore, no *prima facie* basis exists for the Examiner’s new rejection.

2. *No Optical Mode of the Singh Patent Penetrates Into a Sensing Layer so as to Overlap at Least a Major Portion of a Particle of Diameter 1-10  $\mu\text{m}$ .*

The Singh Patent relates to detection of soluble analytes rather than of particles. It thus *neither discloses nor contemplates* increasing depth of penetration of an optical mode from one layer (the second layer) into another (the sensing layer), *much less doing so for the purpose of overlapping a major portion of a particle* whose diameter is approximately 1-10  $\mu\text{m}$ . In this respect the waveguides of the Singh Patent are no better (and likely worse) than the conventional waveguides discussed in the application, which provide penetration depth of only between about 100-250 nm.

According to the Examiner, the Singh Patent purportedly describes “controlling the depth of penetration of the optical mode into the sensing layer . . . to overlap at least a major portion of the particle.” See Office Action at p. 2. *Nowhere*, however, does the Examiner even *attempt* to identify where in the Singh Patent such description occurs. Nor is the Examiner’s failure to do so surprising, as *no* portion of the Singh Patent supports her contention. Yet additional foundation hence exists for concluding the Examiner’s new rejection lacks *prima facie* basis.

3. *The Singh Patent Fails to Disclose any Second Layer Having Refractive Index of 1.33-1.45.*

Finally for present purposes, equally lacking from the disclosure of the Singh Patent is any second layer having refractive index of 1.33-1.45. As Applicants have noted for the Examiner, waveguide structures consistent with the present invention may produce evanescent fields overlapping at least major portions of

particles having diameters of 1-10  $\mu\text{m}$ . The increased penetration may be achieved not merely as a result of the features of the invention discussed earlier, but also as a consequence of selecting a low refractive index for the second layer.

The Examiner acknowledges that no refractive index less than or equal to 1.45 is disclosed for any second layer of the Singh Patent. See Office Action at p. 2. She nevertheless contends that it would have been obvious to replace a second layer of the Singh Patent with one having a lower refractive index--apparently merely because materials with lower refractive indices exist. See id. at p. 3. Such a rationale is wholly inadequate to support an obviousness rejection under *any* applicable test, as nothing in the Singh Patent or knowledge of persons skilled in the art would suggest this type of replacement. For at least this third reason, therefore, Applicants request that the Examiner's new rejection be withdrawn.

### **Petition for Extension of Time**

Pursuant to 37 C.F.R. § 1.136(a), Applicants petition the Commissioner for all extensions of time needed to respond to the Office Action.

### **Fees**

Attached is authorization to charge a credit card for \$120.00 for the petition fee. Applicants believe no other fee presently is due. However, if Applicants' belief is mistaken, the Commissioner is authorized to debit Deposit Account No. 11-0855 for any additional fee due as a consequence of Applicants' submission of this paper.